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Occurrence of Some Mosquito Species in Tha-Ma-Nya Village, Hpa-an Township, Kayin State in Myanmar

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ABSTRACT

Among the numerous species of blood-sucking insects, mosquitoes stand out as most offensive to man and other warm-blooded animals. Mosquitoes were collected by indoor and outdoor CDC light traps in randomly selected household and larvae were collected in and around 3 Kilo meter radius from the study site. A total of 14 species, five genera under family *Culicidae* were recorded in Tha-ma-nya village. Recorded species included two species under genus *Aedes*, three species under genus *Culex* one species under the genus *Armigeres*, one species under the genus *Toxorhynchities* and 7 species under genus *Anopheles*. Species inentification was done according to different morphological keys. Altogether seven out of 14 recorded mosquito species were medically important vector species. *Aedes aegypti* and *Ae. albopictus* were primary and secondary vectors of dengue fever. *Culex quinquefasciatus* is a microfilariasis vector. The important vectors of Japanese encephalitis are *Culex tritaeniorhynchus* and *Culex gelidus*. High density of malaria vector *Anopheles dirus* was collected in outdoor light trap than *An. minimus*, although *An. minimus* was collected high density by indoor CDC light traps. Virus of Japanese encephalitis could transmit from rearing pig and ducks to persons living in the study area. Indoor clear water containers serve as the favorable places for living *Aedes* spp. Outdoor water storage concrete tanks provided stagnant water to breed *Culex* and *Anopheles* species. Water pools, rock pools and rice fields water were found high preferences for breeding of malaria vectors *An. dirus* and *An. minimus* larvae and *An. dirus* larvae was also collected from concrete tanks. Microfilariasis vector *Cx. quinquefqsciatus* and JE vector *Cx. tritaeniorhynchus* larvae were collected from polluted water pools and Dengue vector larvae as *Aedes* larvae were collected from metal drums, bago jars and concrete tanks. Status of the mosquito species composition in the Tha-ma-nya village provided database not only for further researches but also for giving good knowledge and practice in health workers for effective control of vector borne diseases.

Keywords: Occurrence; Vectors; Mosquitoes; Larvae; Habitats; CDC light trap; *Aedes*; *Culex*; *Anopheles*.

Introduction

Among the numerous species of blood-sucking insects, mosquitoes stand out as most offensive, affected on man and other warm-blooded animals. Mosquitoes are a small insects group, consist of family Culicidae, order Diptera. Four stages are consisted of mosquito life cycle such as eggs, larva, pupa and adult. Females adult mosquito lay their eggs in stand water and slowly running water such as lakes, ponds, streams, and in artificial water storage containers as tanks, buckets, earthen jars, plastic drums and metal drums (Khin Maung Kyi 1970, Wikipedia, 2011). In the life cycle of mosquito, the first three instar stages are aquatic and last adult stage need 5 to 14 days depending on species and ambient temperature of environment. Eggs are hatching to become first instar larvae and gradually larvae developed through second, third and four instars larvae. Fully grown fourth instar larvae metamorphoses to pupae. Adult mosquitoes were emerged from the pupae skin by floating at the water surface and the life span of adults are found 4-8 weeks (Clement, 1992).

Mosquitoes mouthparts have a hard trunk to penetrate the skin of man, animal and soft plants for blood and water sucking. Male mosquitoes are always sucking the glucose water plants, fruits and sugar water called nectar feeder, although females mosquitoes of different species are also sucking blood from human and animals. Females need to suck blood for eggs development and their survival of life (Fang, 2010).

Most mosquito species are blood feeders and active in the whole night. Most of the mosquitoes are resting in wet, dark, cool and moisturize place in day time and waiting for evening to take blood meal from human and animals.

Although other mosquito species, as *Aedes* mosquito are day time blood sucking in nature and they are active in daytime for blood meal (Estrada-Franco et al., 1995).

High density of different mosquito species are available in tropical and subtropical regions, *Aedes* species of mosquitoes are familiarize in cold regions. In the tropical regions, mosquitoes are always active in year long. Although mosquitoes are mostly hibernated in temperate Zone, in over winter. In the temperate zones, some mosquito eggs are more tolerant to cold than the warm from warmer regions. In addition, adults can survive throughout winter in suitable microhabitats (Romi et al., 2006).

Temperature, rainfall and relative humidity are control the abundance and density of the mosquitoes. In tropical countries, with no remarkable changing seasons and no significant difference in larval density in year round. Insects are highly sensitive to temperature and rainfall. A grater difference in seasonal abundance found in tropical and temperate species (Lee 1983).

A total about 3500 kind of mosquito species are available in all over the worlds. Some female mosquitoes are main vector play in transmission of disease by sucking the blood from humans (Harun 2007). Historically, vector suppression was accessed as a more economical and effective public health measure than medical therapy (Macdonald 1960). Therefore, identification of the vector is the first step by Rattanaritikul & Panthusiri (1994). To predict the rick of mosquito borne disease in the study area, the detail information of the distribution and composition of vector mosquito species play a key role in changing ecological condition. Therefore, attempt has been made to determine medically important vector species and larval breeding habitats in Tha-ma-nya village in Hpa-an Township, Kayin State in Myanmar.

Materials and Methods

Study area

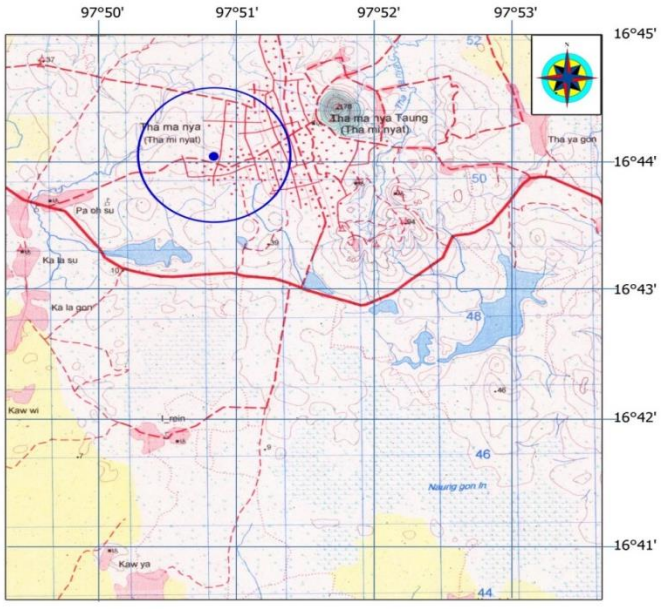

Fig ; Map of the study area
Source ; UTM Map, Sheet No: 1697-09

Tha-ma-nya village was situated at 16˚ 44’ N and 97˚ 50.8’ E in Hpa-an University, Hpa-an Township, Kayin State. Tha-ma-ya village is a sasana areas and population about 1500 are living in this village. Monastery, households,

primary school, police station and guess houses are available in village. Most of the people supports in sasana and monks in monastery. All the people are vegetarian.

Study period

The duration of the study was from December 2019 to September 2020.

Study design

The study was designed base on field to collect mosquito larvae and adult as well as laboratory for mosquito rearing and identification of collected mosquitoes and emerged mosquitoes from larval survey.

Sample collection

Larvae of mosquitoes were caught from 3 Kilo meter radius of the studied site. Mosquito larvae were searched from various places both indoor and outdoor water storage containers in houses, fire extinguishing water containers, domestic water wells, water pools, creeks, ponds, gutters and concrete gutters in open areas of the Tha-ma-nya village.

Larvae were collected three dips/water holding place by WHO net sweeper and pea pets (WHO 1975). All collected larvae were carefully put into the labeled plastic bags and Oxygen was supported by Oxygen pump. Plastic bags were carried to laboratory by car for colonization.

Adult mosquitoes were collected in 5 house holes by outdoor and indoor CDC light trap method from 6:00pm to 6am for 5 days. All collected mosquitoes were identified by different identification keys.

Identification of collected mosquitoes

Adult mosquitoes collected by CDC light traps and emerged mosquito from larval surveys were morphologically identified by different identification Keys (Harrison, 1980; Raid, 1967; Myo Paing, 1990b, Rampa and Prachong 1994).

Data analysis

Data from collected larvae and adult were calculated by Excel software. Density was calculated in percentage.

Results

Medically important mosquito species recorded in the study area

Altogether three genera were collected by CDC light trap from randomly selected houses, such as *Culex*, *Aedes* and *Anopheles* and 11 mosquito species were collected. Of these 9 species were included in the list of medically importance vector species by VBDC (2000).

Aedes aegypti and *Ae. albopictus* were important vectors of dengue fever. *Culex quinquefasciatus* was major vector of microfilariasis. *Culex tritaeniorhynchus, Cx. gelidus* were the importance vectors of Japanese encephalitis. *Anopheles dirus* and *An. minimus* are primary and *An. maculatus, An. hyrcanus* and *An. aconitus* were secondary vectors of malaria and non-vectors *An. vagus, An. barbirostris*, *Armigeres* and *Toxarhynchities* were collected in the field study. Among all recorded species, 84.81% % were medically important vector mosquitoes.

Table 1. Different species of mosquitoes collected by indoor and outdoor CDC light traps catching methods

S. No.	Species	Indoor	Outdoor	Total	Density %	Vectors		Genus
						Total	%	
1	*An. dirus*	8	17	25	8.83	54	19.08	163(57.60%)
2	*An. minimus*	15	14	29	10.25			
3	*An. maculatus*	5	12	17	6.01	60	21.20	
4	*An. hyrcanus*	4	11	20	7.07			
5	*An. aconitus*	12	16	29	10.25			
6	*An. vagus*	4	16	15	5.30			
7	*An. barbirostris*	6	23	28	9.89			
8	*Cx. quinquefasciatus*	26	33	59	20.85	119	42.05	119(42.05%)
9	*Cx. tritaeniorhynchus*	17	27	44	15.55			
10	*Cx. gelidus*	4	12	16	5.65			
11	*Ae. aegypti*	0	1	1	0.35	1	0.35	1(0.35%)
Total		101	182	283	100.00	283	100.00	283(100%)
%		35.69%	64.31%	100				

Table 1 shows, a total of 283 mosquitoes consist of 3 genera as *Anopheles* group (*An. dirus, An. minimus, An. maculatus, An. vagus, An. barbirostris, An. hyrcanus* and *An. aconitus*) 163(57.60%), *Culex* group (*Cx. quinquefasciatus, Cx. tritaeniorhynchus, Cx. gelidus*) (42.05%) and *Aedes* group (*Ae. aegypti*) 1(0.35%) and 11 species were collected by CDC light traps indoor and outdoor collection method. Of this 101(35.69%) consist of 10 mosquito species were collected by indoor and 182(64.31%) consist of 11 species were collected by outdoor. Highest density of *Culex* mosquitoes were collected 119(42.05%) followed by secondary vector *Anopheles* mosquitoes 60(21.20%). Filariasis vector *Culex quinquefasciatus* was collected in highest number 26 and 33 by indoor and outdoor light traps and second most was collected JE vector *Cx. tritaeniorhynchus* 17 and 27 by both methods. In malaria vectors. Higher number of primary vector *An. minimus* was collected in indoor (n=15) than outdoor collection (n=14), although *An. dirus* was higher in outdoor (n=17) than indoor (n=7) light trap collection. In the secondary malaria vectors group *An. aconitus* was collected (n= 12) and (n=16) by indoor and outdoor by light traps. Only one Dengue vector *Ae. eagypti* was collected in night collection by outdoor CDC light trap in village.

Table 2. Preference of larvae habitats in Tha-ma-nya village Hpa-an Township

S. No.	Larval habitats	Total inspected Habitats	Total positive Habitats	Species of larvae	Total larvae	Total larvae in habitats	Density (%)
1	Water pools	25	19 (20.65%)	*An. barbirostris*	33	144	12.39
				An. vagus	21		
				An. minimus	5		
				Cx. quinquefasciatus	47		
				Cx. tritaeniorhynchus	38		

2	Rock pools	8	5 (5.43%)	*An. dirus*	9	51	4.39
				An. maculatus	11		
				An. aconitus	18		
				An. minimus	13		
3	Rice field water pools	28	24 (26.09%)	*Cx. quinquefsciatus*	58	281	24.18
				Cx. tritaeniorhynchus	74		
				Cx. gelidus	38		
				An. barbirostris	15		
				An. hyrcanus	12		
				An. vagus	29		
				An. minimus	11		
				Taxorhynchities	14		
				Armegeris	30		
4	Service tanks	2	2 (2.17%)	*Armegeris*	22	48	4.13
				Cx. quinquefsciatus	26		
5	Concrete tanks	8	5 (5.48%)	*Ae. aegypti*	39	77	6.63
				Ae. albopictus	25		
				An. dirus	13		
6	Metal Drums	21	17 (18.48%)	*Ae. aegypti*	67	110	9.47
				Ae. albopictus	43		
7	Bago Jars	28	17 (18.48%)	*Ae. aegypti*	58	105	9.04
				Ae. albopictus	39		
				Taxorhynchities	8		
8	Stagnant water ponds	3	3 (3.26%)	*Cx. quinquefsciatus*	216	346	29.78
				Cx. tritaeniorhynchus	47		
				Cx. gelidus	23		
				An. barbirostris	13		
				An. hyrcanus	10		
				An. vagus	14		
				An. minimus	8		
				An. aconitus	15		
		123	92		1162	1162	100%

Table 2 shows that larvae habitats in Tha-ma-nya village and found that a total 123 habitats were inspected of this 92 habitats were found different species of mosquito larvae positive. The highest percentage of positive habitat was found rice field water pools 24(26.09%) followed by water pools 19(20.65%) and lowest percentage of larva positive habitats was found service tanks 2(2.17%). The highest density of mosquito larvae was collected in stagnant water ponds 346(29.90%) followed by rice field water pools and lowest density of larvae were collected from service tank 48(41.5%). Main vector *An. dirus* larvae was collected from Rock pools and Concrete tanks only, and *An. minimus* was collected from water pools, rock pools, rice field water pools and stagnant water ponds, of this, highest number of *An. minimus* larvae were observed from rock pools (n=13) followed by rice field water (n=11) and lowest number of larvae were collected from water pools (n=5).

Secondary malaria vector as *An. maculatus* and *An. aconitus* were collected from rock pools water and *An. vagus*, *An. hyrcanus* and *An. barbirostris* was collected in high number from water pools, rice field water pools, and stagnant water pool. High density of *Cx. quinquefasciatus* (Filariasis vector) and *Cx, gelidus* and *Cx. tritaeniorhynchus* (JE vectors) were collected from stagnant water ponds, rice field water pools and water pools. *Toxorhynchities* larvae were found in rice fields, water pools and bago jars only and *Ae. aegypti* and *Ae. albopictus* were observed in concrete tanks, metal drums and bago jars.

Discussions

A total of 14 mosquito species were collected by light trap method and larval surveys from Tha-ma-nya village in the study period. The collected species were *Culex* spp. (3 species), *Aedes* spp. (2 species), *Armigeris* (one species), *Anopheles* spp. (7 species) and lowest was observed *Toxorhychities spp*. (one species). In the tropical regions mosquitoes are very active in year round in the warm and humid areas (Romi et al., (2006), Hanson, S.M., Craig, 1995). And they hibernate in the condition of extremely cold weather. Although, some mosquito species can survive in cold weather in suitable microhabitats. Therefore, the recorded species in the present study, seems to be the cool weather tolerant species, since specimen collections were carried out during cold season (December to February) when the weather is cold (14˚C) in Tha ma nya environs.

In Southeast Asia, a total of 42 species under Genus-*Culex* were observed, only ten species of *Culex* were found in Myanmar (VBDC 2000). In our study three species under Genus *Culex* were collected and they are medically important vectors as *Cx. quinquefasciatus* is a carrier of the microfilariasis and *Cx. gelidus* and *Cx. tritaeniorhynchus* are carrier of the Japanese encephalitis. Other researcher revealed that *Cx. tritaeniorhynchus, Cx. vishnui Cx. gelitus, An. barbirostris, An. vagus* and *An. hyrcanus* were found JE virus positive by PCR methods and they are main vector of JE in India (Reuben, et al., 1994).

Out of 37 species of *Anopheles spp*. distributed throughout Myanmar, ten species have been found to be infested with the malaria parasite (VBDC 2000). In the study area, among *Anopheles* species, main malaria vector *An. dirus* and *An. minimus*, and suspected vectors *An. hyrcanus, An. maculatus* and *An. aconitus* as well as non-vectors *An. barbirostris* and *An. vagus* were collected during the study period. Of these species, main vectors *An. dirus* and *An. minimus* and suspected vectors *An. maculatus* and *An. aconitus* were medically important vectors of malaria parasites (VBDC 2000).

In Thabwewa village, *An. dirus* and *An. minimus* were abundantly collected using cattle bait catching method second most was human bait indoor and outdoor catching in Thabwewa village (Tun Lin et al., 1995) and also both *An. dirus* D and *An. minimus* A were abundantly collected from Ka-taine-htit village Kamamaung Township in Kayin State and only *An. minimus* was collected in Koe Mine village in Ye Township Mon State (Maung Maung Mya et al., 2018, 2020). In Rakhaine State, *An. annularis* is responsible for local transmission. *Anopheles sundaicus* is responsible vector for malaria transmission in coastal regions (VBDC 2014, Khin Maung Kyi 1970). In Indonesia malaria vectors as *Anopheles sundaicus, An. subpictus, An. barbirostris, An. maculatus, An. aconitus,* and *An. balabacensis* are extensively occurring species (Takken et al., 1990, Harijanto 2000). Other researcher revealed that survivability of *An. subpictus, An. barbirostris* and *An. vagus* had sufficient longevity for parasite development and *An. barbirostris* was found peak activity inside the house in night (Ndoen et al., 2012).

In the present study *An. dirus* larvae were observed in rock pools and concrete tanks although *An. dirus* larvae were abundantly present in domestic wells in Mon, Taninthayi and Kamamaung Township, Kayin State (Tun Lin et al., 21988, Htay Aung et al., 1999, Maung Maung Mya et al., 2018) *Anopheles minimus* was collected in water pools, rock pools, rice field water pools and stagnant water ponds, of this highest number of *An. minimus* larvae were found in rock pools, second most was found in rice field water, lowest number of larvae were collected from water pools. *An. minimus* is a main vector of malaria in Myanmar and bred in slowly running water in foot hill areas in Oktwin and paddy fields in Tangoo Townships in Bago Region, slowly running water and sand pools in Sedawgyi village in Madaya Township in Mandalay Region, bank of the Yunsalin Creek in Ka-taine-htit village Kamamaung Township Kayin State and paddy fields and creeks in Myo Thit Township Magwe Region and *An. minimus* larvae collected together with *Aedes cogelly* and *Cx. quinquefasciatus* larvae in water wells in Koe Mine village in Ye Township Mon State (Maung Maung Mya et al., 2018,2020, Pe Than Tun et al., 2013, Phyo Wai Win 2013).

Aedes mosquitoes are potential vectors of dengue virus, transmission is high in children group. Six *Aedes* species were observed in Southeast Asia and *Ae. aegypti* is a main vector and *Ae. albopictus* is a secondary vectors of dengue virus (Rattanaritikul & Panthusiri 1994, VBDC 2014, Rueda 2004). During the study period, out of two recorded species, *Ae. aegypti* and *Ae. albopictus* were most abundantly found in different water storage containers in the study area. Same result has been found in different areas by different authors, Nyunt Nyunt Oo and party revealed that *Ae. aegypti* and *Ae. albopictus* larvae were abundantly observed in earthen pots and big bago jars in Pakakku Township Magwe Region (Nyunt Nyunt Oo et al., 2019). Although, Metal drums, big bago jars, Spirit bowls, Concrete jars and Car tires were Key containers for *Aedes* larvae in Shwe Pyi Thar, Taketa and Thanlyin Townships in Yangon Region and Blue plastic drum in Hpa-an Township Kayin State (Myint Myint Chit 2007, Thin Thin Swe et al., 2019). Another study in Kayin State *Aedes* larvae were abundantly collected in Concrete tank, Concrete jars, Spirit bowls, Big bago jars, Car tires, and plastic drums were found key containers (500 and above larvae positive) (Nan Than Than Kyi 2015, Ni Ni Win 202).

Aedes aegypti and *Ae. albopictus* are vectors of Dengue fever (DF), Dengue heamorrigic fever (DHF) virus and harmful to children and to adult ages (Hlain Myat Thu 2009). In general, mosquitoes of *Anopheles spp*. Transmit malaria, *Culex spp*. transmit the Japanese encephalitis and urban filariasis, and *Aedes spp*. transmits the dengue virus (Harun 2007). Therefore, all recorded mosquito species of the present study were possible vector species

causing dengue, malaria, microfilariasis and Japanese encephalitis except *Armegeris* and *Taxorhynchities*. *Armegeris* larvae were collected from polluted water pools, service tanks water in Yangon and *Taxorhynchities* larvae was collected from Bago jars and Car tire with *Aedes* larvae and *Taxo* larvae are predators of *Aedes* larvae although adult *Taxo* are drinking nectar throughout the adult life. They have not taken any blood meal from human and animals. For adopting appropriate vector control measures is essential to review the distribution and species composition of vector mosquitoes (Dutta et al., 2020).

In Tha-ma-nya village, person living in houses and chummeries store water for cooking and bathing in concrete tanks, iron drum, bago jars and earthen jars ect. Those were served as the favorable places for indoor living *Aedes spp* in clear water. Water storage concrete tanks in the Tha-ma-nya provided stagnant clean water to breed *Aedes* and *Anopheles* species although polluted concrete tanks was found *Culex* larvae. Other researcher found that high number of *Aedes* larvae were found in Concrete tanks in Pakakku Township, Magwe Region and Hpa-an Township Kayin State and Thayin township Yangon Region (Nyunt Nyunt Oo et al., 2019, Myint Myint Chit 2007, Nan Than Than Kyi 2015, Ni Ni Win 202).

Most of the larvae of *Aedes spp*. in the present study were collected from the water storage tanks, drums, earthen pots containing pure or rain water although *Culex* larvae were collected in dirty stagnant water in water pools and concrete tanks (unused tanks) and contaminated with debris and mosses at the outdoor places. High density of *Culex* larvae were collected in polluted water pools as well as *An. barbirostris* and *An. vagus* were also collected in water pools. Rattanarithikul and Pantusiri (1994) stated that *Culex spp.* breed in pools water placed in open field and accords with the present study.

In the present study, larvae of *Anopheles spp.* were collected at the concrete tanks containing stagnant water un-shaped open field and main malaria vector *An. dirus* larvae were collected from concrete tanks and rock pools and minimus larvae were collected in slowly running water, water pools. Same result has been found in Oktwin Township, Shwe Kyin Township Bago Region and Paletwa Township Chin State and wells in Coastal regions of Mon, Taninthayi Region and Kayin State (Tun Lin et al., 1995, Maung Maung Mya et al., 2018,2020,2022, Htay Aung et al., 1999). The results are agreed with the finding of Rattanarithikul and Panthusiri (1994), they revealed that larvae of *Anopheline* develop at small pools in open area such as forest, orchards and plantations in Thailand.

Majority of the larvae of *Aedes spp.* were collected from various types of water storage containers containing clear water in the buildings and *Ae. aegypti* and *Ae. albopictus* larvae were found high density in discarded containers containing organic debris and in drums, Bago jars and concrete tanks. Although Nan Than Than Kyi (2015) revealed that *Aedes* larvae were abundantly collected in tree hole which was used as cow feeding device. Plenty of larvae were observed in drums and bago jars which were placed under the roof in raining season (Nan Than Than Kyi 2015). *Aedes spp*. were successfully developed in clear water, but no need only clear water to develop their life cycle (Lee 1983). This statement is agreed with the finding of the present study.

In India pig rearing is a source for Japanese encephalitic virus infection in vector mosquitoes in native population (Dutta et al., 2020). Cattle, pig and birds are important in maintaining reservoirs of the Japanese encephalitis virus in nature, *Culex quinquefasciatus* feeds extensively on cattle, pig and birds and also feed on man. Virus of Japanese encephalitis transmit from animal host as pigs and ducks to men by mosquito vectors (Pant 1979, Gupta and Rao).

As instance of Dutta et al. (2020), pigs and chickens were reared near the houses in the Tha-ma-nya village so as virus of Japanese encephalitis could transmit from those animals to persons, if any carries (both animals and man) of the Japanese encephalitis virus were living in the Tha-ma-nya village. The observation of research revealed that abundance of breeding habitats of different vector mosquitoes and the high prevalence of main vectors in Tha-ma-nya village is under risk for occurrence of outbreak of mosquito borne diseases, if sanitation and bio-safety programs were not properly carried out in the whole Tha-ma-nya measure. The findings of the present study provide database not only for further researches but also for public health workers to effective control and prevention of mosquito borne diseases in the Tha-ma-nya village.

Conclusion

Altogether 14 species, three genera under family *Culicidae* were recorded in the Tha-ma-nya village during December, 2019 to September, 2020. It included under the genus of *Aedes*, *Culex*, *Anopheles*, *Armigeres* and *Toxorhynchites*, of these, 2 *Aedes* species under the genus *Aedes*, 3 species under genus *Culex*, 7 species under genus *Anopheles* and one species each under the genus *Armigeres* and *Taxorhynchities* species. The recorded species in the present study seems to be the cool weather tolerant species. Morphological keys were provided for identifying record genera and particular species. Altogether eight out of 14 recorded mosquito species were included in the list of medically important vector species by VBDC. All recorded mosquito species were possible vector species causing dengue, malaria, microfilariasis and Japanese encephalitis. Indoor clear water containers served as the favorable places for indoor living *Aedes spp*. Outdoor water storage concrete tanks provided stagnant water to breed *Culex* and *Anopheles* species. Virus of Japanese encephalitis could transmit from rearing pigs and ducks to human living in the Tha-ma-nya village. Therefore, Tha-ma-nya village is at risk for occurrence of outbreak of mosquito borne diseases, if sanitation and bio-safety programs were not properly carried out in the whole Tha-ma-nya measure. Occurrence of the mosquito species in the study area provides database for further researches and public health workers to effective prevention of mosquito borne diseases.

Declarations

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Competing Interests Statement

The authors have declared no competing interests.

Consent for Publication

The authors declare that they consented to the publication of this study.

Authors' Contribution

All authors took part in literature review, research, and manuscript writing equally.

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